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(54) THERMOPLASTIC ELASTOMER COMPOSITION**(57)Abstract:**

PROBLEM TO BE SOLVED: To provide a new thermoplastic elastomer composition which has rich flexibility, excellent formability and excellent compression permanent set.

SOLUTION: This thermoplastic elastomer composition comprises (A) an isobutylene block copolymer comprising (a) an isobutylene polymer block having a silicone group bound to a hydrolysable group or hydroxyl group at the terminal and (b) a polymer block consisting mainly of an aromatic vinyl compound, and (B) an olefin resin. The composition preferably comprises 100 compound of the component (A) and 10 to 200 pts.wt. of the component (B). The composition is preferably cross-linked, when the components (A) and (B) are melted and kneaded.

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CLAIMS

[Claim(s)]

[Claim 1] The thermoplastic-elastomer constituent containing the isobutylene system block copolymer (A) containing the polymer block (b) which makes a subject the isobutylene system polymer block (a) and aromatic series vinyl system compound which have at the end the silicon radical combined with the hydrolysis nature machine or the hydroxyl group, and olefin system resin (B) [claim 2] The thermoplastic-elastomer constituent according to claim 1 which contains the olefin system resin (B) of the 10 - 200 weight section to the isobutylene system block-copolymer (A) 100 weight section.

[Claim 3] A thermoplastic-elastomer constituent given in claims 1 and 2 over which a thermoplastic-elastomer constituent constructs a bridge dynamically at the time of melting kneading of an isobutylene system block copolymer (A) and olefin system resin (B).

[Claim 4] Furthermore, the thermoplastic-elastomer constituent according to claim 1 to 3 which contains a silanol condensation catalyst as a (C) component.

[Claim 5] Furthermore, the thermoplastic-elastomer constituent according to claim 1 to 4 which contains a plasticizer as a (D) component.

[Claim 6] The thermoplastic-elastomer constituent according to claim 5 which carries out 10-300 weight section content of the plasticizer (D) to the total quantity 100 weight section of (A) and (B).

[Claim 7] An isobutylene system block copolymer (A) is a thermoplastic-elastomer constituent according to claim 1 to 5 which number average molecular weight is 2000-100,000, and is the block copolymer which has the silicon radical combined with at least one hydrolysis nature machine or a hydroxyl group per molecule at the end.

[Claim 8] the polymer block (a) whose isobutylene system block copolymer (A) which has at the end the silicon radical combined with the hydrolysis nature machine or the hydroxyl group makes an isobutylene a subject, and the polymer block (b) which makes an aromatic series vinyl system compound a subject — (b)-(a)- the thermoplastic-elastomer constituent according to claim 1 to 3 which is the triblock copolymer in which the structure of (b) is shown.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the new thermoplastic-elastomer constituent which was rich in flexibility, was excellent in fabrication nature, the rubber-property, and the mechanical strength, and was excellent in the compression set property.

[0002]

[Description of the Prior Art] Conventionally, what blended the cross linking agent, the reinforcing agent, etc. with rubber, such as natural rubber or synthetic rubber, and constructed the bridge under elevated-temperature high pressure as polymeric materials which have elasticity is used widely. However, with such rubber, the stroke which performs bridge formation and shaping over long duration under elevated-temperature high pressure is required, and it is inferior to workability. Moreover, since the rubber which constructed the bridge does not show thermoplasticity, generally recycle shaping is impossible for it like thermoplastics. Therefore, the thermoplastic elastomer which can manufacture mold goods easily like usual thermoplastics using general-purpose melting forming technique, such as heat press forming, injection molding, and extrusion molding, is developed variously in recent years. The polymer of various formats, such as current, an olefin system, an urethane system, an ester system, a styrene system, and a vinyl chloride system, is developed and marketed by such thermoplastic elastomer. Since recycle use is easy for these, they are used in recent years in broad fields, such as autoparts, household-electric-appliances components, wire covering material, medical components, miscellaneous goods, and footwear.

[0003] A styrene thermoplastic elastomer is rich in flexibility, and excellent in good rubber elasticity with ordinary temperature. [among these] As a styrene thermoplastic elastomer, the styrene-butadiene-styrene block copolymer (SBS), the styrene-isoprene-styrene block copolymer (SIS), a styrene-ethylene butylene-styrene block copolymer (SEBS), a styrene-ethylene propylene-styrene block copolymer (SEPS) that hydrogenated them, etc. are known. However, these block copolymers had the inadequate compression set property.

[0004] The isobutylene system block copolymer which contains the polymer block which makes an isobutylene a subject, and the polymer block which makes an aromatic series vinyl system compound a subject as what was rich in flexibility, was excellent in good rubber elasticity with ordinary temperature, and was further excellent in thermal stability, weatherability, vibration-damping nature and gas barrier property, and sealing performance also in the styrene thermoplastic elastomer is known. However, this isobutylene system block copolymer also had a problem in the compression set.

[0005] On the other hand, rubber, an organic polymer, and the technique made to compound-ize for high-performance-izing of thermoplastic elastomer. It is known for many years. To polyolefines, such as PP, especially Olefin system elastomers, such as EPDM and IIR. Or about the technique of making the bridge formation object of styrene system elastomers, such as SEBS, compound-izing, it succeeds in many examination. In the case of thermoplastic elastomer olefin, for example, crystalline olefin resin and olefin system rubber. The technique (JP.53-21021.B) which constructs a bridge using organic peroxide, the technique which constructs a

bridge using phenol resin (JP.58-48138.B). Although the technique (JP.11-166075.A, JP.11-181172.A) which constructs a bridge using a hydrosilyl radical is reported and use (JP.9-137007.A) of special structure isobutylene rubber is reported. All used the olefin system rubber in which a double bond exists at random as a point constructing a bridge, such as EPDM and IIR, into the olefin system polymer as a rubber component, its bridge formation was uneven, and the reduction in a degree of hardness was difficult for them.

[0006]

[Problem(s) to be Solved by the Invention] In view of the technical problem of the above-mentioned conventional technique, the purpose of this invention is rich not only in thermal stability and weatherability characteristic of a polyisobutylene segment, vibration-damping nature, and gas barrier property but flexibility, and is to offer the thermoplastic-elastomer constituent excellent in fabrication nature, especially a compression set property.

[0007]

[Means for Solving the Problem] That is, this invention is a thermoplastic-elastomer constituent containing the isobutylene system block copolymer (A) containing the polymer block (b) which makes a subject the isobutylene system polymer block (a) and aromatic series vinyl system compound which have at the end the silicon radical combined with the hydrolysis nature machine or the hydroxyl group, and olefin system resin (B), and it is desirable to contain the olefin system resin (B) of the 10 - 200 weight section to the isobutylene system block-copolymer (A) 100 weight section.

[0008] Said thermoplastic-elastomer constituent can construct a bridge dynamically at the time of melting kneading of an isobutylene system block copolymer (A) and olefin system resin (B). As a constituent, further, as a (C) component, a silanol condensation catalyst can be contained and a plasticizer can also be contained as a (D) component. As for said plasticizer (D), it is desirable to carry out 10-300 weight section content to the total quantity 100 weight section of (A) and (B).

[0009] Moreover, the number average molecular weight of an isobutylene system block copolymer (A) is 2000-100,000. It is desirable that it is the block copolymer which has per molecule the silicon radical combined with at least one hydrolysis nature machine or a hydroxyl group at the end, the polymer block (a) which makes an isobutylene a subject as structure of an isobutylene system block copolymer (A), and the polymer block (b) which makes an aromatic series vinyl system compound a subject — (b)-(a)- it is desirable that it is the triblock copolymer in which the structure of (b) is shown.

[0010]

[Embodiment of the Invention] The thermoplastic-elastomer constituent of this invention comes to contain the isobutylene system block copolymer (A) and olefin system resin (B) containing the polymer block (b) which makes a subject the isobutylene system polymer block (a) and aromatic series vinyl system compound which have at the end the silicon radical combined with the hydrolysis nature machine or the hydroxyl group.

[0011] The polymer block (a) which makes a subject the isobutylene of the isobutylene system block copolymer (A) of this invention means the block with which an isobutylene occupies 90 % of the weight or more preferably 70% of the weight or more 50% of the weight or more. Although monomers other than an isobutylene under polymer block which makes an isobutylene a subject will not be limited especially if they are monomer components in which cationic polymerization is possible, they can illustrate monomers, such as dienes, such as aromatic series vinyl, aliphatic series olefins, an isoprene, a butadiene, and a divinylbenzene, allyl compound ether, and beta-pinene. These may be used independently, and two or more sorts may be combined and they may be used.

[0012] The polymer block (b) which makes a subject the aromatic series vinyl system compound of an isobutylene system block copolymer (A) means the block with which an aromatic series vinyl system compound occupies 90 % of the weight or more preferably 70% of the weight or more 50% of the weight or more. Although there will be especially no limit if it is the monomer in which cationic polymerization is possible as monomers other than the aromatic series vinyl compound under polymer block which makes an aromatic series vinyl system compound a

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subject, monomers, such as aliphatic series olefins, dienes, allyl compound ether, and beta-pinene, can be illustrated. As an aromatic series vinyl system compound of a polymer block (b), styrene, alpha methyl styrene, beta-methyl styrene, p-methyl styrene, t-butyl styrene, monochlorostyrene, dichloro styrene, methoxy styrene, an indene, etc. are mentioned. Also in the above-mentioned compound, styrene, alpha methyl styrene, p-methyl styrene, and an indene are desirable from the balance of cost, physical properties, and productivity, and you may also choose two or more sorts from them. Especially if monomers other than an isobutylene under polymer block which makes an aromatic series vinyl system compound a subject are monomer components in which the above-mentioned cationic polymerization is possible, they will not be limited, but they may be used independently, and two or more sorts may be combined and they may be used.

[0013] It is related with the rate of the polymer block (b) which makes a subject the polymer block (a) which makes a subject the isobutylene in an isobutylene system block copolymer (A), and an aromatic series vinyl compound. Although there is especially no limit, the polymer block (a) which makes an isobutylene a subject from the balance of physical properties and workability 95 - 20 weight section. It is desirable that the polymer block (b) which makes an aromatic series vinyl compound a subject is 5 - 80 weight section. It is desirable that the polymer block (b) whose polymer block (a) which makes an isobutylene a subject makes a subject 90 - 60 weight section and an aromatic series vinyl compound is especially 10 - 40 weight section.

[0014] Moreover, the structure which consists of at least one of the polymer blocks (a) which make an isobutylene a subject from the point of the physical properties of the constituent obtained and workability, and at least two of the polymer blocks (b) which make an aromatic series vinyl system compound a subject as desirable structure of the isobutylene system block copolymer (A) of this invention is desirable. the above — structure — ***** — especially — a limit — there is nothing — although — for example — (— b —) — (— a —) — (— b —) — from — forming — having — a triblock — a copolymer — [(— b —) — (— a —)] — a unit — a repeat — having — multi — a block copolymer — and — (— b —) — the jib which consists of (a) — at least one sort chosen from the star-like polymer which uses a lock copolymer as an arm can be used. furthermore, the polymer which makes an isobutylene a subject into an isobutylene system block copolymer (A) in addition to the above-mentioned structure, the polymer which makes an aromatic series vinyl system compound a subject, and (a)- the jib which consists of (b) — at least one sort of a lock copolymer may be contained. However, it is desirable that the thing of the structure which consists of at least one of the polymer blocks (a) which make a subject the isobutylene contained in an isobutylene system block copolymer (A), and at least two of the polymer blocks (b) which make an aromatic series vinyl system compound a subject becomes 50% of the weight or more from the point of physical properties and workability.

[0015] Although there is especially no limit also in the number average molecular weight of an isobutylene system block copolymer (A), 1,000-500,000 are desirable, and 2,000 to especially 100,000 is good ****. The fall of a moldability etc. is large when a mechanical property etc. is not fully discovered when number average molecular weight is less than 1,000, and exceeding 500,000.

[0016] The silicon radical combined with the hydrolysis nature machine or the hydroxyl group at the end expresses the radical which has Si-X association, when for example, a hydrolysis nature machine or a hydroxyl group is set to X. Usually, Si-OH and H-X are given by the hydrolysis reaction of Si-X association.

[0017] These silicon radical is a functional group known well, and is (general formula D:-(SiR12-bXbO) m-SiR23-aXa (I) as the example of representation. Each of R1 and R2 among [type The alkyl group of carbon numbers 1-20, the aryl group of carbon numbers 6-20, The aralkyl radical or R3SiO of carbon numbers 7-20 - (R3 is the univalent hydrocarbon group of carbon numbers 1-20) three R3 — being the same — differing — — — — — it is the Tori ORGANO siloxy radical shown, and when R1 or two or more R 2 exist, they may be the same and may differ. X is a hydrolysis nature machine or a hydroxyl group, and when two or more pieces exist, they may be the same and may differ. a is an integer chosen

from 0-3, and b is an integer chosen from 0-2. However, a+m+b>=1 is filled. Moreover, b in m (SiR12-bXbO(s)) does not need to be the same, m is an integer chosen from 0-19.] It can come out and the radical expressed can be mentioned.

[0018] Although it may not be limited and the hydrolysis nature machine of the conventional known may be used especially as a hydrolysis nature machine in a general formula (I), as an example, a hydrogen atom, an alkoxy group, an acyloxy radical, a KETOKISHI mate radical, the amino group, an amide group, an amino oxy-radical, a sulphydryl group, an alkenyloxy radical, etc. can be mentioned, for example. Among these, hydrolysis nature is mild and the point of being easy to deal with it to especially an alkoxy group is desirable.

[0019] This hydrolysis nature machine and hydroxyl group can be combined with one silicon atom in the 1-3 range, and, as for (a+m), it is desirable that it is the range of 1-5. When a hydrolysis nature machine and a hydroxyl group join together in [two or more] a reactant silicon radical, even if they are the same, they may differ. The number of the silicon atoms which form this reactant silicon radical one, and although you may be two or more pieces, it is desirable that it is 20 things in the case of the silicon atom connected by siloxane association etc. Especially, it is general formula (II):-SiR23-aXa (II). (— R2, X, and a are the same as the above among a formula.) — the reactant silicon radical expressed — acquisition — since it is easy, it is desirable.

[0020] From availability, an alkoxy silyl radical or an alkyl alkoxy group is desirable, from a reactant field, a trimethoxysilyl radical, a methyl dimethoxy silyl radical, a triethoxy silyl radical, and especially a methyl diethoxy silyl radical are desirable, and, more specifically, the point of the balance of reactivity and preservation stability to a methyl dimethoxy silyl radical is still more desirable.

[0021] A reactant silicon radical is averaged per molecule of an isobutylene system copolymer, its at least one piece is desirable, and its 1.1-5 pieces are still more desirable. If the number of the reactant silicon radicals contained in a molecule becomes less than one piece, cross-linking will become inadequate and will stop being able to discover good rubber elasticity behavior easily. The reactant silicon radical may exist in the end of an isobutylene system copolymer chain, may exist in the interior, and may exist in both. Since the effective network chain density of the isobutylene system copolymer component contained in the bridge formation object finally formed increases in having at least one of a reactant silicon radical at the chain end especially, it is desirable from points, like the rubber-like bridge formation object of the high elongation in high intensity becomes is easy to be obtained. Moreover, the isobutylene system copolymer which has these reactivity silicon radical may be used independently, and may be used together two or more sorts.

[0022] After carrying out a polymerization with iniphor method in the case of an isobutylene system copolymer, it is known that many functional groups can be introduced. For example An alkenyl radical (JP.63-105005.A, JP.1-248406.A, WO 90/15081, JP.4-288309.A, etc.), (Meta) acrylic radicals (JP.2-88814.A etc.) and a hydroxyl group (Ivan et al. — J. Polymer Sci. Polymer Chem. Ed. 18 3177 (1980), JP.4-20501.A, JP.11-302320.A, JP.2000-119330.A, JP.2000-103810.A, etc. are illustrated by carbonyl groups (JP.2000-150076.A, JP.2000-169518.A, etc.) and glycidyl groups (U.S. Pat. No. 4429099 etc.).

[0023] And it is possible to compound easily the organic polymer which has hydrolysis nature silicon radicals (JP.63-006041.A, JP.63-6003.A, JP.1-197509.A, JP.4-103506.A, JP.7-53882.A, etc.) at the molecule end based on the functional group by which installation was carried out [above-mentioned].

[0024] Moreover, the isobutylene system copolymer which has a reactant silicon radical in intramolecular is manufactured by adding and carrying out copolymerization of the vinylsilane and arylsilane which have a reactant silicon radical into the monomer which is mainly concerned with an isobutylene. Furthermore, the isobutylene system copolymer which has a reactant silicon radical at both the interior of a molecule and the molecule end can be manufactured by introducing a reactant silicon radical into an end, after carrying out copolymerization of the vinylsilane and arylsilane etc. which have a reactant silicon radical in addition to the monomer which constitutes a principal chain in the polymerization at the time of manufacturing the

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isobutylene system copolymer which has a reactant silicon radical at the above-mentioned molecule end.

[0025] The olefin system resin (B) used by this invention is ethylene, the alpha olefin homopolymer whose content of the alpha olefin of carbon numbers 3-20 is 50-100-mol %, or a copolymer, and polypropylene is preferably illustrated by high density polyethylene, low density polyethylene, polypropylene, ethylene propylene rubber, EPR, EPDM, an ethylene butene copolymer, an ethylene octene copolymer, a polyisobutylene, isobutylene isoprene rubber, chlorinated butyl rubber, brominated butyl rubber, and the physical-properties target.

[0026] As for the loadings of olefin system resin (B), it is desirable that it is the 10-200 weight section to the isobutylene system block-copolymer 100 weight section of a component (A), and it is still more desirable that it is the 20-100 section. When the loadings of olefin system resin (B) exceed the 200 weight sections, it is in the inclination for an improvement of a compression set property to become scarce. Moreover, when less than 20 weight sections, it is in the inclination which a problem produces in a moldability.

[0027] As for the thermoplastic-elastomer constituent which consists of the isobutylene system block copolymer and olefin system resin (B) of a component (A), what constructed the bridge dynamically at the time of melting kneading is desirable.

[0028] The bridge formation formed here — the inside of the body — (A) or (B) — the object with which either constructed the bridge independently, (A), and (B) — coincidence — bridge formation — the object which was contained inside of the body and constructed the bridge is contained. It is desirable to form a bridge formation object by the (A) independent among these.

[0029] The property which the hydrolysis radical combined with the silicon radical on which the isobutylene system copolymer which is the (A) component has the cross-linking constituent of this invention is all hydrolyzing and forming siloxane association (silanol condensation reaction) in part, and was especially excellent is discovered.

[0030] (A) In order to make a component construct a bridge by the silanol condensation reaction, to the constituent of this invention, it is possible to add a silanol condensation catalyst [(C) Component]. As an example of a silanol condensation catalyst, for example Tin, aluminum, a titanium system compound, or salt [of an amine system compound, an amine system compound, a carboxylic acid, etc.]; — low-molecular-weight polyamide resin; obtained from superfluous polyamine and polybasic acid — the resultant gamma-aminopropyl trimethoxysilane of a superfluous polyamine and a superfluous epoxy compound — Well-known silanol condensation catalysts, such as silanol condensation catalysts, such as amine compound [of the silane coupling agent system which has amino groups, such as N-(beta-aminoethyl) aminopropyl methyl dimethoxysilane,], an acid catalyst of further others, and a basic catalyst, etc. can be illustrated.

[0031] As an example of said tetravalent tin system condensation catalyst, tetravalent tin carboxylate, such as dibutyltin bisacetylacetonate, dibutyltin alkoxide, dibutyltin diacetate, dibutyltin maleate, and dibutyltin diacetate, is raised, for example, moreover, as an example of silanol condensation catalysts other than the tin system condensation catalyst of the above-mentioned tetravalence Divalent tin system condensation catalysts, such as octylic acid tin; Tetraethyl titanate, Titanate, such as tetra-propyl titanate; Aluminum tris acetylacetonate, Aluminum system condensation catalyst; zirconium tetraopropyl acetylacetonate; lead octylate, such as aluminum tris ethyl acetoacetate and JISOPURPOKISHI aluminum ethyl acetoacetate; A butylamine, An octyl amine, a lauryl amine, dibutyl amine, monoethanolamine, Diethanolamine, triethanolamine, diethylenetriamine, Triethylenetriamine, an oleyl amine, cyclohexylamine, Benzylamine, diethylamino propylamine, xylylene diamine, Triethylenediamine, guanidine, diphenylguanidine, 2 and 4, 6-tris (dimethyl aminomethyl) phenol, They are amine system condensation catalysts, such as morpholine, N-methyl morpholine, 2-ethyl-4-methylimidazole, 1, and 8-diazabicyclo (5, 4, 0) undecene-7 (DBU).

[0032] Although a silanol condensation catalyst is freely chosen according to a service condition, the tin system compound from the field of storage stability, and a cure rate and availability, especially its dibutyl tin compound are desirable. The above-mentioned silanol condensation catalyst may be used only by one kind, and may carry out two or more kind mixing use. As for a

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2006/11/30

such as a methoxy group, an ethoxy radical, a propoxy group, and an oxime radical, is illustrated, for example. Although there is no limit especially in the usable range as functional groups other than the silyl radical which exists in a hydrolysis nature machine content silane compound, a vinyl group, an methacrylic radical, an acrylic radical, a sulfinyl group, a hydroxyl group, an isocyanate radical, the amino group, an amide group, a glycidyl group, etc. make it illustrate. As a more concrete example, ethyl silicate, a silicate condensate, vinyltrimethoxysilane, 3-methacryloxy propyl trimethoxysilane, 3-aminopropyl trimethoxysilane, 3-aminopropyl methyl dimethoxysilane, 3-aminopropyl methyl diethoxysilane, 3-aminopropyl triethoxysilane, N-methyl-3-aminopropyl trimethoxysilane, N-phenyl-3-aminopropyl trimethoxysilane, N-(beta-aminoethyl) aminopropyl methyl dimethoxysilane, 3-isocyanato propyltrimethoxysilane, 3-isocyanato propyl triethoxysilane, 3-glycidyl propyltrimethoxysilane, etc. are illustrated.

[0036] As for the above-mentioned silane compound, it is desirable to use it in the range of the 0.01-50 section to the isobutylene system (copolymer A) 100 section which has a reactant silicon radical. It is desirable to use it in the range of the one to 10 section further the 0.1 to 30 section especially.

[0037] The above-mentioned silane compound may be used only by one kind, and may carry out two or more kind mixing use. For example, silicate from the semantics of storage stability, vinyltrimethoxysilane, One or more sorts of compounds chosen from 3-methacryloxy propyl trimethoxysilane are used. From the field of adhesive grant to furthermore, 3-aminopropyl trimethoxysilane 3-aminopropyl methyl dimethoxysilane, 3-aminopropyl triethoxysilane, N-methyl-3-aminopropyl trimethoxysilane, N-phenyl-3-aminopropyl trimethoxysilane, N-(beta-aminoethyl) aminopropyl methyl dimethoxysilane, The operation of using one or more sorts of compounds chosen from 3-isocyanato propyltrimethoxysilane, 3-isocyanato propyl triethoxysilane, and 3-glycidyl propyltrimethoxysilane is also possible. The olefin system resin which has the silicon radical combined with the hydrolysis nature machine or the hydroxyl group may be added. A graft polymer generates by the reaction in a system with the isobutylene system block copolymer of this component and a component (A). Consequently, an improvement of the compatibility of the isobutylene system block copolymer of a component (A) and the polyolefin system resin of a component (B) is expectable. As polyolefin in this component, the polymer of structure which may be compatible in the olefin system resin of a component (B) is desirable, and it is desirable that it is especially the same structure as a component (B). As olefin system resin of a component (B), since polypropylene is desirable, polypropylene is desirable also as polyolefin in this component. Although some which are marketed have as the manufacture approach of this component (Mitsubishi Chemical, phosphorus kuron, etc.) and especially a limit does not have them, in the case of polypropylene, the process indicated by JP.10-298249A, JP.10-77374A, etc. is mentioned, for example. Moreover, the demand characteristics further doubled with each application at the constituent of this invention are accepted. For example, a styrene-butadiene-styrene block copolymer (SBS) and a styrene-isoprene-styrene block copolymer (SIS). Moreover, the styrene-ethylene butylene-styrene block copolymer (SEBS) and styrene-ethylene propylene-styrene block copolymer (SEPS) which hydrogenated them, Furthermore, also to elastomers, such as non-denaturalized SBS, thermoplastics, and others A filler, a reinforcing agent, a silane coupling agent, an adhesive grant agent, a radical cross linking agent and a bridge formation assistant, an antioxidant (a phenolic antioxidant and an aromatic amine system antioxidant —) A sulfur system hydroperoxide decomposition agent, the Lynn system hydroperoxide decomposition agent, A benzotriazole system ultraviolet ray absorbent, a SARSHI rate system ultraviolet ray absorbent. Various additives, such as a photo-setting resin, waxes and flow nature amelioration agents, such as a benzophenone system ultraviolet ray absorbent, HINDATO amine system light stabilizer, and a nickel system light stabilizer, lubricant, a surfactant, a foaming agent, a flame retarder, and a pigment, can be blended suitably if needed. The filler used for this invention is used for the purpose, such as property grants, such as a degree of hardness, reinforcement, and ductility, and a cost cut. A calcium carbonate, clay, talc, a silica, an alumina, a glass fiber, A carbon fiber, a mica, graphite, a fume silica, a sedimentation nature silica, A silicic acid anhydride, carbon black, titanium oxide, a magnesium carbonate, a quartz, Since aluminum impalpable

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2006/11/30

silanol condensation catalyst, it is desirable to use it from the standpoint of a bridge formation rate or storage stability in the range of the 0.01-50 section to the isobutylene system (copolymer A) 100 section which has a reactant silicon radical. It is desirable to use it in the range of the 0.1 to 5 section further the 0.1 to 30 section especially. In order to raise a moldability and flexibility further in the constituent of this invention in addition to the isobutylene system block copolymer of a component (A), olefin system resin (B), and a silanol condensation catalyst (C), to it, it is desirable to add a plasticizer (D) further.

[0033] That there is no limit in the range appropriate for the purpose of this invention as a plasticizer (D) For example, polybutene, hydrogenation polybutene, hydrogenation alpha olefin oligomer, Polyvinyl system oligomer, such as atactic polypropylene; A biphenyl, triphenyl etc. — aromatic series system oligomer; — polyene system oligomer [such as liquid polybutadiene,]; — hydrogenation polyene system oligomer [such as hydrogenation liquid polybutadiene,]; — a paraffin oil — paraffin series oligomer [such as a chloroparaffin oil,]; — naphthene (cycloparaffin system) oligomer [such as a naphthene oil,]; — dibutyl phthalate; Diethylphthalate, di(2-ethylhexyl) phthalate, butyl benzyl phthalate, Di-n-octyl phthalate, JIISO nonyl phthalate, di-isodecyl phthalate, Phthalic ester, such as di-undecyl phthalate; A di(2-ethylhexyl) horse mackerel peat, A di-n-octyl horse mackerel peat, a JIISO nonyl horse mackerel peat, di-isodecyl adipate, Non-aromatic dibasic acid ester, such as di(2-ethylhexyl) SEBASHIKETO and tetrahydrophthalic acid JI 2-ethylhexyl; Trimellitic acid Tori 2-ethylhexyl, Aromatic series system ester, such as trimellitic acid triisobutyl; Butyl oleate, Fatty acid ester, such as methyl acetyl ricinolate and pentaerythritol ester; Diethylene-glycol benzoate, The ester of polyalkylene glycols, such as TORIEHIRENURIKORUJIBENZOETO; epoxy plasticizers, such as phosphoric ester; epoxidized soybean oil, such as tricresyl phosphate and tributyl phosphate, and epoxidation linseed oil, etc. can be used. These may be used independently and may be used together two or more sorts. The straight mineral oil especially used as a plasticizer (D) in the case of processing of rubber, or using liquefied or the synthetic softener of low molecular weight — it is desirable. As straight mineral oil, although the high-boiling point petroleum component of above-mentioned paraffin series, a naphthene, and an aromatic series system is mentioned, the paraffin series and the naphthene which do not check crosslinking reaction are desirable. As liquefied or a synthetic softener of low molecular weight, although there is especially no limit, above-mentioned polybutene, hydrogenation polybutene, liquid polybutadiene, hydrogenation liquid polybutadiene, and the Pori alpha olefins are mentioned. These plasticizers (D) can use one or more sorts. As for the loadings of a plasticizer (D), it is desirable that it is the 10-300 weight section to the isobutylene system block-copolymer 100 weight section of a component (A). If loadings exceed the 300 weight sections, a problem will arise in a fall and moldability of a mechanical strength.

[0034] In addition to the above-mentioned (A) component, the (B) component, the (C) component, and the (D) component, according to the demand characteristics doubled with each application, it can blend with the constituent of this invention as olefin system resin which has the silicon radical combined with the tackifier, the hydrolysis nature machine content silane compound, the hydrolysis nature machine, or the hydroxyl group suitably. Although a tackifier is used for adjustment of adhesiveness, an adhesive property, resin phase solubility, viscosity control, etc. and it is generally used, according to the purpose, it can choose from inside freely, for example, a petroleum resin system, a phenol system, a terpene system, a rosin ester system, a denaturated terpene system, a hydrogenation terpene system, a pinene system, a cumarone indene system, styrene systems, those hydroxylation objects, etc. are illustrated. Although other combination presentations and a target property determine the amount of the tackifier used and there is especially no limit in the usable range, it is desirable to use it in the range of the 2-1000 section to a total of 100 sections of the (A) component and the (B) component. It is desirable to use it in the range of the ten to 100 section especially.

[0035] A hydrolysis nature machine content silane compound has effectiveness, such as adhesive improvement, and cross-linking, storage stability adjustment, and can be suitably used according to a need property. Although a hydrolysis nature machine content silane compound kind does not have a limit especially in the usable range, a thing with hydrolysis nature machines,

http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web.cgi_ejje

2006/11/30

powder, the Flint powder, zinc dust, wood flour, PARUBU, a cotton chip, asbestos, walnut shell powder, chaff powder, the diatom earth, clay, etc. are usable and are fire-resistant grant. Fire-resistant bulking agents, such as an aluminum hydroxide, a magnesium hydroxide, and ammonium phosphate, can be used. Moreover, hygroscopic bulking agents, such as a zeolite, silica gel, and a molecular sieve, can be used from the purpose of the hygroscopic grant mentioned later. These fillers may be used independently and may be used together two or more sorts.

[0038] As an example of said silane coupling agent gamma-aminopropyl trimethoxysilane, gamma-aminopropyl triethoxysilane, gamma-aminopropyl methyl dimethoxysilane, gamma-aminopropyl methyl diethoxysilane, gamma-(2-aminoethyl) aminopropyl trimethoxysilane, gamma-(2-aminoethyl) aminopropyl methyl dimethoxysilane, gamma-(2-aminoethyl) aminopropyl triethoxysilane, gamma-(2-aminoethyl) aminopropyl methyl diethoxysilane, gamma-ureido propyltrimethoxysilane, N-phenyl-gamma-aminopropyl triethoxysilane, Amino-group content silanes; gamma-mercaptopropyltrimethoxysilane, such as N-benzyl-gamma-aminopropyl triethoxysilane and N-vinylbenzyl-gamma-aminopropyl triethoxysilane, gamma-mercaptopropyl triethoxysilane, gamma-mercaptopropylmethyl dimethoxysilane, Sulfhydryl group content silanes, such as gamma-mercaptopropylmethyl diethoxysilane; Gamma-glycidoxypropyltrimethoxysilane, gamma-glycidoxypropyltriethoxysilane, gamma-glycidoxypropylmethyl dimethoxysilane, beta-(3, 4-epoxycyclohexyl) ethyltrimethoxysilane, Epoxy group content silanes, such as beta-(3, 4-epoxycyclohexyl) ethyltriethoxysilane; beta-carboxy ethyltriethoxysilane, A beta-carboxy ethyl phenyl bis(2-methoxyethoxy) silane, Carboxy silanes, such as N-beta-(carboxymethyl) aminoethyl-gamma-aminopropyl trimethoxysilane; Vinyltrimethoxysilane, Vinyltriethoxysilane, gamma-methacryloyl oxypropyl methyl dimethoxysilane, vinyl mold partial saturation radical content silanes [such as gamma-AKUROYLOxypropylmethyl triethoxysilane,]; — halogen content silanes [such as gamma-chlorobenzoyltrimethoxysilane,]; — isocyanurate silanes [such as tris (trimethoxysilyl) isocyanurate,]; — gamma-isocyanate propyltrimethoxysilane, gamma-isocyanate propyl triethoxysilane, Isocyanate radical content silanes, such as gamma-isocyanate propylmethyl diethoxysilane and gamma-isocyanate propylmethyl dimethoxysilane, can be mentioned. Moreover, the amino denaturation silyl polymer which is the derivative which denaturalized these, a silanizing amino polymer, a partial saturation amino silane complex, a block isocyanate silane, a phenylamino long-chain alkyl silane, amino silanizing silicone, silanizing polyester, etc. can be used as a silane coupling agent.

[0039] The above-mentioned silane coupling agent may be used only by one kind, and may carry out two or more kind mixing use. Adhesive grant agents other than a silane coupling agent can also be used for the thermoplastic-elastomer constituent of this invention.

[0040] Moreover, a radical cross linking agent may be made to share. As a catalyst, radical initiators, such as organic peroxide, are used as a catalyst. It is not limited especially as a radical initiator. For example, G t-butyl peroxide, 2, the 5-dimethyl-2, 5-JI (t-butylperoxy) hexane, 2, the 5-dimethyl-2, 5-JI (t-butylperoxy)-3-hexyne, Dialkyl peroxide like dicumyl peroxide, t-butyl cumyl peroxide, alpha, and alpha-bis(t-butylperoxy) isopropylbenzene, Benzoyl peroxide, p-chloro benzoyl peroxide, m-chloro benzoyl peroxide, 2, 4-dichlorobenzoyl peroxide, diacyl peroxide like lauroyl peroxide, Peroxy-acid ester like perbenzoic-acid-t-butyl, fault JI carbonic acid disopropyl, Peroxi dicarbonate [like fault JI carbonic acid G 2-ethylhexyl], 1, and 1-JI (t-butylperoxy) cyclohexane, 1, and 1-JI (t-butylperoxy) — Peroxy ketal like a 3, 3, and 5-trimethyl cyclohexane etc. can be mentioned. 2, the 5-dimethyl 2, 5-JI (tert-butylperoxy) hexane, 2, the 5-dimethyl 2, 5-JI (tert-butylperoxy) hexyne-3 are [among these] desirable in respect of odor nature, coloring nature, and scorching stability.

[0041] The loadings of organic peroxide have the desirable range of 0.5-5 weight section to the isobutylene system block-copolymer 100 weight section at the time of addition of organic peroxide.

[0042] The constituent of this invention can blend the bridge formation assistant which has an ethylene system partial saturation radical on the occasion of the bridge formation processing by organic peroxide. An ethylene system partial saturation radical is a polyfunctional methacrylate monomer like a divinylbenzene, a polyfunctional vinyl monomer like a triaryl SHIANU rate or ethylene glycol dimethacrylate, diethylene-glycol dimethacrylate, triethylene glycol

http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web.cgi_ejje

2006/11/30

dimethacrylate, polyethylene glycol dimethacrylate, trimethylolpropanetrimethacrylate, and allyl compound methacrylate etc. These may be used independently or may use at least two or more sorts. With such a compound, homogeneity and efficient crosslinking reaction are expectable.

[0043] In order to be easy to deal with ethylene glycol dimethacrylate and triethylene glycol dimethacrylate, to have a peroxide solubilization operation and to work as a distributed assistant of peroxide also especially in it, since the homogeneity and bridge formation thermoplastic elastomer which was effective and was able to balance hardness and rubber elasticity is obtained, the bridge formation effectiveness by heat treatment is desirable. The addition of the above-mentioned bridge formation assistant has the desirable range of the 0.5 - 10.0 weight section to the isobutylene system block-copolymer denaturation object 100 weight section. If the addition of a bridge formation assistant is less than the 0.5 sections, the effectiveness as a bridge formation assistant will not be acquired but 10 weight sections will be exceeded, there will be a possibility of independent gelation of a bridge formation assistant progressing and bringing about a physical-properties fall, and cost will cost dearly.

[0044] As an example of said phenolic antioxidant, 2, 6-G t-butylphenol, 2, 4-G t-butylphenol, 2, 6-di-tert-butyl-4-methylphenol, 2,5-di-tert-butylhydroquinone, n-octadecyl-3-(3, 5-G t-butyl-4-hydroxyphenyl) propionate, Pentaerythrityl-tetrakis [3-(3, 5-G t-butyl-4-hydroxyphenyl) propionate], A 2 and 2'-methylenebis (4-methyl-6-t-butylphenol), 4, and 4'-bitylidenebis (3-methyl-6-t-butylphenol), 4, and 4'-thio screw (3-methyl-6-t-butylphenol) etc. can be illustrated.

[0045] As an example of said aromatic amine system anti-oxidant, it is N and N'-diphenyl-p-phenylene diamine and 8-ethoxy. - It is 2, 2, and 4-trimethyl. -A 1 and 2-dihydroquinoline etc. can be illustrated.

[0046] As an example of said sulfur system hydroperoxide decomposition agent, dialkyl -3, 3'-thiodipropionate, JITORIDESHIRU -3, 3'-thiodipropionate, distearyl -3, 3'-thiodipropionate, etc. can be illustrated.

[0047] Diphenyl isooctylphosphite, triphenyl phosphite, etc. can be illustrated as an example of said Lynn system hydroperoxide decomposition agent.

[0048] As an example of said benzotriazole system ultraviolet ray absorbent, 2-(3, 5-G t-butyl-2-hydroxyphenyl)-5-chlorobenzo triazole, 2-(3-t-butyl-5-methyl-2-hydroxyphenyl)-5-chlorobenzo triazole, 2-(3, 5-G t-butyl-2-hydroxyphenyl) benzotriazole, 2-(5-methyl-2-hydroxyphenyl) benzotriazole, etc. can be illustrated.

[0049] As an example of said SARISHI rate system ultraviolet ray absorbent, 4-t-butylphenyl SARISHI rate, 2 and 4-G t-butylphenyl-3 and 5'-G t-butyl-4'-hydroxy benzoate etc. can be illustrated.

[0050] As an example of said benzophenone system ultraviolet ray absorbent, 2, 4-dihydroxy benzophenone, 2-HIDOROKI-4-methoxybenzophenone, 2-HIDOROKI-4-n-octoxybenzophenone, a 2-HIDOROKI-4-n-dodecyloxy benzophenone, a 2-HIDOROKI-4-benzoyloxy benzophenone, etc. can be illustrated.

[0051] As an example of said HINDATO amine system light stabilizer Bis(2, 2, 6, 6, - tetramethyl-4-piperidyl) sebacate, Bis(1, 2, 2, 6, 6, - pentamethyl-4-piperidyl) sebacate, 1-[2-(3-(3, 5-G t-butyl-4-hydroxyphenyl) propionyloxy) ethyl]-4-[3-(3, 5-G t-butyl-4-hydroxyphenyl) propionyloxy]-2, 2, 6, 6, and 6, and - tetramethylpiperidine - 4-benzoyloxy - 2, 2, 6, 6, - tetramethylpiperidine, etc. can be illustrated.

[0052] As an example of said nickel system light stabilizer, nickel dibutyl dithio carbamate and [bis(2 and 2'-thio] (4-t-octyl phenolate)]-2-ethylhexylamine nickel (II) [bis(2 and 2'-thio] (4-t-octyl phenolate)]-n butylamine nickel (II) etc. can be illustrated.

[0053] These antioxidants may be used independently and may be used together two or more sorts. As compared with the case where it is used independently, it may function more effectively by using together.

[0054] This invention - thermoplastic elastomer - a constituent - most - being desirable - a constituent - ***** - an end - hydrolysis - a sex - a machine - or - a hydroxyl group - having joined together - silicon - a radical - having - an isobutylene - a system - a polymer - a block - (- a -) - aromatic series - vinyl - a system - a compound - a

http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web.cgi_ejje

2006/11/30

press forming, blow molding, etc.

[0061] The cross-linking constituent of this invention is available for garments and footwear applications, such as a food-grade way, the miscellaneous-goods application for days, a toy, movement and a sporting gear application, a stationary application, an automatic in-the-car sheathing application, engineering works and a building use, AV and a household-electric-appliances device application, OA and a business machine application, and an object for electrical and electric equipment, a textile application, a medical-application way, a health application, a package transportation application, an electric-wire application, etc.

[0062] Specifically the thermoplastic-elastomer constituent of this invention It excels in flexibility, the moldability, and the compression set property. A sheet, a Plastic solid, It is fabricated by a viscous element, foam, etc. Sheets, such as an engineering-works sheet and a tarpaulin, Seal material, such as a packing material, a sealant, a gasket, and a plug, a structural damper, An automobile, a car, the sound deadener for home electronics and vibroisolating material that are called CD damper, A medical-application catheter, a medical container, a medical-application cap, a paper diaper, sanitary items, It can be effectively used as wire covering material, a cable, a connector, a plug, automobile interior material, the shaping material for automobiles, other various containers, a cushioning material, grip material, shock absorbing material, a packing material, an asphalt modifier, and a resin modifier.

[0063]

[Example] Although this invention is further explained below at a detail based on an example, this invention does not receive a limit at all by these. In addition, in advance of an example, various measuring methods, an appraisal method, and an example are explained.

[0064] (Degree of hardness) Based on JIS K 8352, the test piece used 12.0mm ** press sheet.

[0065] (Compression set) Based on JIS K 6262, the test piece used 12.0mm thickness press sheet. It measured on condition that deformation 100 degree-Cx 22 hours, and 25%. Moreover, the cable address and the concrete contents of the ingredient used for below in the example and the example of a comparison are as follows.

(Component A): SISIBS: The polystyrene-polyisobutylene-polystyrene triblock copolymer which contains a methyl dimethoxy radical in molecule both ends [number average molecular weight 15000 and molecular weight degree of dispersion 1.5]

Component (B): P P: Polypropylene, Mitsui Chemicals, Inc. make (trade name "the high pole J300")

(Component C): silanol condensation catalyst: - dibutyltin dilaurate (component E): plasticizer: - paraffin series process oil and Idemitsu petrochemical company make (trade name "Diana process oil PW-90")

SIBS: Polystyrene-polyisobutylene-polystyrene triblock copolymer [number average molecular weight 87000 and molecular weight degree of dispersion 1.5]

[Example 1 of manufacture] Manufacture of the polystyrene-polyisobutylene-polystyrene triblock copolymer (SISIBS) with which the silicon radical combined with the methoxy group was introduced into the end

A syringe is used after carrying out the nitrogen purge of the inside of the polymerization container of the separable flask of 2L. n-hexane (what was dried by molecular sieves) 456.1mL, and butyl chloride (what was dried by molecular sieves) 656.5mL are added. After attaching a polymerization container all over -70-degrees C dry ice / methanol bus and cooling. The liquid-sending tube made from Teflon (trademark) was connected to proof-pressure glass liquefaction extraction tubing with a three-way cock containing isobutylene monomer 20.1mL (2132mmol), and the isobutylene monomer was sent by nitrogen pressure in the polymerization container. p-JIKUMIRU chloride 2.6g (11.2mmol) and 1.22g (14mmol) of N,N-dimethylacetamide were added. Next, titanium-tetrachloride 9.9mL (90.0mmol) was added further, and the polymerization was started. After agitating at the temperature same for 1.5 hours from polymerization initiation, polymerization solution abbreviation 1mL was sampled as an object for a sampling from the polymerization solution. Then, the mixed solution of styrene monomer 52g (499mmol) beforehand cooled at -70 degrees C, n-hexane 23.9mL, and butyl chloride 34.3mL was added in the polymerization container.

http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web.cgi_ejje

2006/11/30

subject - ** - carrying out - a polymer - a block - (- b -) - containing - an isobutylene - a system - a block copolymer - (- A -) - bridge formation - an object - 100 - weight - the section - receiving - an olefin - a system - resin - (- B -) - 20 - 100 - weight - the section - a plasticizer - (- D -) - ten - 300 - weight - the section - it is.

[0055] Moreover, especially the manufacture approach of the thermoplastic-elastomer constituent of this invention is not limited, but if they are the isobutylene system block copolymer (A) containing the polymer block (b) which makes a subject the isobutylene system polymer block (a) and the aromatic-series vinyl system compound which have the silicon radical combined with the hydrolysis nature machine or the hydroxyl group at the end, olefin system resin (B), and the approach with which the above-mentioned component used by the case may be mixed by homogeneity, it can adopt all.

[0056] When constructing a bridge dynamically in a component (A) and/or olefin system resin (B) and manufacturing the thermoplastic-elastomer constituent of this invention at the time of melting mixing of a component (A) and olefin system resin (B), it can carry out preferably by the approach of illustrating below.

[0057] For example, a lab PURASUTO mill, Brabender, a Banbury mixer, a kneader, Although manufactured using making machines, such as melting kneading equipment of continuous system, such as direct-vent-system kneading equipments, such as a roll, or batch type kneading equipment, a single screw extruder, and a twin screw extruder, or extrusion molding, injection molding, and compression molding After carrying out melting kneading, adding moisture subsequently to it and crosslinking reaction's fully advancing until it mixes all components beforehand and becomes homogeneity, the approach of stopping melting kneading is employable. In performing the above-mentioned method of performing dynamic bridge formation to melting kneading and coincidence, the temperature of 140-210 degrees C is desirable.

[0058] The constituent of this invention discovers the especially excellent description by making the (A) component construct a bridge by the silanol condensation reaction as mentioned above. It is effective in a silanol condensation reaction in supply of moisture, and although there is especially no limit as the supply approach of the moisture in this invention, after fabricating the approach of supplying moisture, for example just before fabricating to the approach of supplying moisture at the time of kneading of (1) constituent, and the constituent which carried out (2) kneading, and the constituent which carried out (3) kneading, it is the approach of supplying moisture etc. and control of a silanol condensation reaction is possible. (1) and (2) are especially desirable.

[0059] Moreover, the various addition approaches can choose, for example, a mixer or the static or high hydrolysis nature machine content silane compound of an approach and temperature dependence which mixes with a mechanical mixer add for moisture and/or a hydrolysis nature machine content silane compound before kneading, the approach of controlling a reaction by the temperature change and the compound to which water made stick add, and, in the case of the approach of adding moisture etc. before kneading, the approach of controlling a reaction by the temperature change etc. is illustrated. When using the hydrate of a metal salt as a source of supply of required moisture, the hydrate of a metal salt can use widely what is usually marketed, for example, the hydrate of an alkaline-earth-metal salt, the hydrate of other metal salts, etc. are mentioned. Also in these, the hydrate of an alkali-metal salt and the hydrate of an alkaline-earth-metal salt are desirable, and MgSO4.7H2O, Na2CO3.10H2O, Na2SO4.10H2O, Na2SO3.5H2O, Na3PO4.12H2O, and Na2B4O7.10H2O etc. is specifically mentioned. As for the hydrate of a metal salt, it is desirable to use it in the range of the 0.01 - 50 section to the isobutylene system copolymer 100 section of a component (A). Especially, it is still more desirable to use it in the range of the two to 10 section the one to 20 section the 0.1 to 30 section. The hydrate of the above-mentioned metal salt may be used only by one kind, and may carry out two or more kind mixing use.

[0060] The thermoplastic-elastomer constituent of this invention can be fabricated using the shaping approach and shaping equipment which are generally adopted to a thermoplastics constituent, for example, can carry out melting shaping by extrusion molding, injection molding,

http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web.cgi_ejje

2006/11/30

[0066] 45 minutes after adding this mixed solution, allyl compound trimethyl silane 12ml (10.0mmol) was added. After stirring at temperature as it is for 60 minutes, the methanol of about 40 mL(s) was added and the reaction was terminated.

[0067] After distilling a solvent etc. out of a reaction solution, it dissolved in toluene and rinsing was performed twice. Furthermore, the toluene solution was added to a lot of methanols, the polymer was settled, and the target block copolymer was obtained by carrying out the vacuum drying of the obtained polymer at 60 degrees C for 24 hours. The molecular weight of the polymer obtained by the gel-permeation-chromatography (GPC) method was measured. Mn of the isobutylene polymer before styrene addition of 10500 and Mw/Mn is 1.40, and the block copolymer whose Mw/Mn Mn of the block copolymer after a styrene polymerization is 15000, and is 1.50 was obtained.

[0068] In this way, 80g and dimethoxymethylsilane 2.8g were made to react among the obtained allyl group and polystyrene-polyisobutylene-polystyrene triblock copolymers. As a catalyst, 5.6mg (0.00000831 mmol/mu L xylene solution) of platinum vinyl siloxane complexes was added. The reaction was performed at 90 degrees C for 8 hours. The polystyrene-polyisobutylene-polystyrene triblock copolymer with which the silicon radical combined with the methoxy group was introduced into the end was obtained after reduced pressure drying.

[0069] [[Example 2 of manufacture] Manufacture of a styrene-isobutylene-styrene block copolymer (SIBS)]

A syringe is used after carrying out the nitrogen purge of the inside of the polymerization container of the separable flask of 2L. n-hexane (what was dried by molecular sieves) 456.1mL, and butyl chloride (what was dried by molecular sieves) 656.5mL are added. After attaching a polymerization container all over -70-degrees C dry ice / methanol bus and cooling. The liquid-sending tube made from Teflon (trademark) was connected to proof-pressure glass liquefaction extraction tubing with a three-way cock containing isobutylene monomer 232mL (2871mmol), and the isobutylene monomer was sent by nitrogen pressure in the polymerization container. p-JIKUMIRU chloride 0.647g (2.8mmol) and 1.22g (14mmol) of N,N-dimethylacetamide were added. Next, titanium-tetrachloride 8.67mL (79.1mmol) was added further, and the polymerization was started. After agitating at the temperature same for 1.5 hours from polymerization initiation, polymerization solution abbreviation 1mL was sampled as an object for a sampling from the polymerization solution. Then, the mixed solution of styrene monomer 77.9g (748mmol) beforehand cooled at -70 degrees C, n-hexane 23.9mL, and butyl chloride 34.3mL was added in the polymerization container. 45 minutes after adding this mixed solution, the methanol of about 40 mL(s) was added and the reaction was terminated.

[0070] After distilling a solvent etc. out of a reaction solution, it dissolved in toluene and rinsing was performed twice. Furthermore, the toluene solution was added to a lot of methanols, the polymer was settled, and the target block copolymer was obtained by carrying out the vacuum drying of the obtained polymer at 60 degrees C for 24 hours. The molecular weight of the polymer obtained by the gel-permeation-chromatography (GPC) method was measured. Mn of the isobutylene polymer before styrene addition of 50,000 and Mw/Mn is 1.40, and the block copolymer whose Mw/Mn Mn of the block copolymer after a styrene polymerization is 67,000, and is 1.50 was obtained.

[Example 1] Adding [carried out melting kneading of the SISIBS using the lab PURASUTO mill (Oriental machine company make) which set the 100 sections and PP as the 25 sections, and set these as 170 degrees C, and] water for the plasticizer 150 section and the silanol condensation catalyst 2.5 section gradually subsequently, after carrying out melting kneading, addition and, melting kneading was further carried out at 170 degrees C until the value of torque showed the peak price, and dynamic bridge formation was performed. The obtained thermoplastic-elastomer constituent was able to be easily fabricated at 180 degrees C in the shape of a sheet with the Shindo metal industry company make and a pressurization press. The degree of hardness and compression set of the obtained sheet were measured according to the above-mentioned approach. The degree of hardness was 42 and the compression set was 40%. (Example 1 of a comparison) After carrying out melting kneading for 10 minutes using the lab PURASUTO mill which set SIBS at 180 degrees C, it fabricated at 180 degrees C in the shape of

http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web.cgi_ejje

2006/11/30

a sheet. The degree of hardness of the obtained sheet was 47, and the compression set was 87%.

[0071]

[Table 1]

成分 (A)	S I S I B S (重量部)	実施例 1	比較例 1
	S I B S (重量部)	1 0 0	1 0 0
成分 (B)	P P (重量部)	2 5	
成分 (C)	シクロノール-ブチル-メタクリレート (重量部)	2. 6	
成分 (D)	可塑剤 (重量部)	1 5 0	
	硬度 (Shore A、点検)	4 2	4 7
	圧縮永久変形 (%)	4 0	8 7

Thus, the thermoplastic-elastomer constituent of an example 1 showed the compression set value quite lower than a SIBS simple substance, though it was a degree of hardness almost equivalent to the SIBS simple substance which is an isobutylene system block copolymer shown in the example 1 of a comparison.

[0072]

[Effect of the Invention] Thus, the thermoplastic-elastomer constituent of this invention is a new thermoplastic-elastomer constituent which was rich in flexibility and was excellent in fabrication nature, especially a compression set property.

[Translation done.]